

Docket: 8071-188T (OPP030864US)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Dae-Ho CHOO, et al.

Examiner: Timothy L. Rude

Serial No.: 10/602,054

Group Art Unit: 2883

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Docket: 8071-188T (OPP030864US)

For: **IN-LINE SYSTEM AND METHOD FOR MANUFACTURING LIQUID
CRYSTAL DISPLAY**

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
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APPEAL BRIEF

Sir:

In response to the Final Office Action dated September 29, 2006 rejecting claims 1, 2, 4-20 and 56 under 35 U.S.C. § 103 (a) and the advisory Action dated December 28, 2006, Applicants appeal pursuant to the Notice of Appeal dated January 29, 2007, and respectfully submits this appeal brief.

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1. REAL PARTY IN INTEREST

The real party in interest is Samsung Electronics Co., Ltd, by virtue of assignment dated March 28, 2001 and recorded July 16, 2001 in the United States Patent and Trademark Office at reel 011988 and frame 0300. The above assignment is for U.S. Patent Application Serial No. 09/838,385, filed April 20, 2001, now issued as U.S. Patent No. 6,657,701, of which the present application serial no. 10/602,054, filed June 24, 2003 is a divisional. Pursuant to MPEP 306, the assignment of an application carries over to a continuation or a divisional of that application.

2. RELATED APPEALS AND INTERFERENCES

The following related and commonly assigned U.S. patent applications are under appeal:

a) U.S. Patent Application Serial No. 11/028,642 is currently under appeal with an appeal brief having been filed by the Applicants.

b) U.S. Patent Application Serial No. 10/878,395 is currently under appeal with a reply brief having been filed by the Applicants in response to the Examiner's answer.

3. STATUS OF THE CLAIMS

Claims 1, 2, 4-20 and 56 are pending and stand rejected. Claims 1, 2, 4-20 and 56 are under appeal. A copy of the claims under appeal is presented in the Claims Appendix attached herewith.

4. STATUS OF THE AMENDMENTS

Claims 21-32 were canceled after Final Rejection by Applicants' amendment filed on November 29, 2006. No other amendments were made after Final Rejection.

5. SUMMARY OF CLAIMED SUBJECT MATTER

It is to be understood that the following description of the claimed subject matter and references to the specification and drawings are for illustrative purposes only to provide some context for the claimed subject matter, but shall not be construed as placing any limitations thereon or limiting the scope thereof.

An in-line system for manufacturing liquid crystal displays is provided. As set forth in claim 1, an in-line system for manufacturing liquid crystal displays comprises a sealant-applying unit depositing sealant on one of two substrates, either one of the two substrates having at least one liquid crystal cell (See Application at page 6, lines 8, page 7, lines 22-page 8, line 1 and Figure 3 at reference numeral 3000), a sealant heat-treating unit forming a reaction-prevention layer on a surface of the sealant to prevent a reaction between the sealant and a liquid crystal material (See Application at page 6, line 9, page 8, lines 20-21 and Figure 3 at reference numeral 4000), a liquid crystal depositing unit depositing the liquid crystal material on the substrate where the sealant is deposited (See Application at page 6, line 9, page 9, lines 13-15 and Figure 3 at reference numeral 5000), a substrate-attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state (See Application at page 6, line 14, page 11, lines 3-6 and Figures 3, 10 and 12 at reference numeral 8000) and an in-line convey unit conveying the substrates in the in-line system (See Application at page 6, lines 11-16 and Figures 3, 10 and 11 at reference numerals 1110, 1120, 1130, 1140, 1150, 1170 and 1180).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. Claim 1 has been objected on the grounds that the recitation of "a sealant heat-treating unit..." in this claim is drawn to non-elected invention VI.

II. It is alleged by the Examiner that the Applicants admitted that none of the species recited in claims 1, 2, 4-20 and 56 are not patentably distinct over each other.

III. Claims 1, 2, 4-20 and 56 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,978,065 to Kawasumi et al. ("the Kawasumi patent") in view of Japanese Patent Application Publication No. JP56114928A to Adachi ("the Adachi publication").

7. ARGUMENTS

I. Claim 1 has been objected to on the grounds that this claim recites the feature of "a sealant heat-treating unit..." which is drawn to non-elected invention VI.

The above objection to claim 1 should be removed for at least the reasons set forth below.

(i) RESTRICTION/ELECTION REQUIREMENT IMPROPER

The Examiner has objected to claim 1 as reciting a feature, i.e. "a sealant heat-treating unit..." which was non-elected in response to the restriction/election requirement issued on December 15, 2003. (See pages 2 and 3 of the Final Office Action dated September 29, 2006).

Applicants disagree with the above objection to claim 1 and note that the restriction/election requirement issued on December 15, 2003 in connection with the present application was clearly improper for at least the reasons discussed below. In the above-mentioned restriction/election requirement, the Examiner restricted claims 1-32 and 56 to eleven (11) different inventions (Inventions I to XI). This restriction included the sealant-applying unit

(invention I), sealant heat-treating unit (invention VI), liquid crystal depositing unit (invention II), substrate-attaching unit (invention III) and in line convey unit (invention IX) elements currently recited in pending claim 1 as being restricted to separate inventions. (See pages 2 and 3 of Office Action dated December 15, 2003). In addition, the above restriction/election requirement also included the first and second loading unit (invention IV) currently recited in pending dependent claim 2 and 4-7, the substrate combination unit (invention V) currently recited in pending dependent claims 2 and 4-7, the spacer dispersing unit (invention VII) currently recited in pending dependent claim 56, the two or more vacuum chambers (invention X) currently recited in pending dependent claims 8-10 and exposure unit (invention XI) currently recited in claim 11, as being restricted to separate inventions. (See pages 2 and 3 of Office Action dated December 15, 2003).

If a search and examination of all the claims and species can be made without serious burden, the Examiner must examine them on the merits, even though they may include claims and species directed to independent or distinct inventions (See MPEP 803 and 808.01). However, the Examiner has failed to show why there would have been a serious burden in examining all of the claims 1-32 and 56 at the time the restriction was made for at least the reasons set forth below.

Rather, all of the claims, i.e. 1-32 and 56 pending at the time of the restriction/election requirement were drawn to an in-line system for manufacturing liquid crystal displays and were all classified in class 349. In addition, practically all of the alleged separate inventions I-XI were part of the same class (i.e. class 349) and the same subclass (i.e. subclass 187), except for inventions I (classified as class 349, subclass 189) and II (classified as class 349, subclass 190). However, it is noted that subclasses 187, 189 and 190 are all classified under the same heading of "Nominal Manufacturing Methods or Post Manufacturing Processing of Liquid Crystal Cell" in class 349 of the USPTO Manual of Classification, thereby clearly indicating that they are each related to one another.

Thus, there would not have been a serious burden on the Examiner to examine claims 1-32 and 56 at the time the restriction requirement was made because as discussed all of these claims 1-32 and 56 are in the same class 349. Furthermore, all of these claims (1-32 and 56) are

likewise in the same field of search because as mentioned, claims 1-32 and 56 are all drawn to an in-line system for manufacturing liquid crystal displays in the same class 349. Accordingly, the issuance of the above Restriction/Election Requirement was clearly erroneous and therefore this restriction/election should not be applied to pending claims 1, 2, 4-20 and 56. Consequently, the above objection to pending claim 1 should thus be withdrawn.

(ii) OBJECTION TO CLAIM 1 IS MOOT

Even assuming arguendo that the above restriction/election of species requirement were proper, this issue is now moot with regard to pending claim 1 because the Examiner, in spite of the restriction/election requirement has already performed a full search and examination of all of the features currently recited in pending claim 1, including the features allegedly drawn to the non-elected inventions. Specifically, the Examiner has stated on the record that all of the features currently recited in pending claim 1, including the "sealant heat-treating unit..." feature objected to in claim 1, are all taught by the cited art. (See pages 4 and 9 of the Final Office Action dated September 29, 2006). The Examiner also expressly admits on the record that he examined non-elected features recited in pending claim 1 in the interest of compact prosecution. (See page 3 of the Final Office Action dated September 29, 2006). It is further noted that the Examiner had already previously withdrawn the current objection to claim 1 based upon the "sealant heat-treating unit..." feature and then, as mentioned above, subsequently examined this feature prior to reintroducing this same objection. (See page 2 of the Final Office Action dated February 28, 2006 and page 9, paragraph 3 of the Final Office Action dated September 29, 2006).

In addition, one of the references cited by the Examiner i.e., Kamasumi reference, is in search class 349 but does not include the subclass (i.e. subclass 187) of any of the alleged elected features (invention IX) recited in claim 1. Rather, the Kawasumi reference includes subclasses (subclasses 189 and 190) of the alleged non-elected inventions I and II. This further indicates the Examiner's intent to also include the features drawn to the alleged non-elected inventions as part of his examination of claim 1.

In sum, by stating that the cited art discloses all of the features recited in claim 1, including the alleged non-elected features and by citing references which are in different subclasses than the alleged elected feature but in the same subclass as the alleged non-elected features recited in claim 1, it is clear that the Examiner intended to and did in fact perform a full search and examination of all of the features recited in this claim, including the features deemed to be non-elected.

Consequently, the Examiner by his actions has in effect constructively withdrawn the restriction/election requirement with respect to pending claim 1 for at least the reasons set forth above. Therefore, the above objection to claim 1 is now moot and should thus be removed.

II. It is alleged by the Examiner that the Applicants admitted that none of the species recited in claims 1, 2-20 and 56 are not patentably distinct over each other.

The Examiner alleges that Applicant admitted on the record on May 20, 2004 and December 6, 2005 that the species recited in claims 1, 2-20 and 56 are not patentably distinct over one another. (See page 2 of the Final Office Action dated September 29, 2006). Applicants respectfully disagree with the Examiners' position.

The Examiner appears to have interpreted Applicants arguments in response to the above restriction/election requirement issued on December 15, 2003 as an admission that the species recited in claims 1, 2-20 and 56 are "not patentably distinct" from each other in terms of obviousness. This interpretation by the Examiner is wholly erroneous. Whether or not the expression "not patentability distinct", may be interpreted to mean that none of the species recited in claims 1, 2-20 and 56 are obvious over each other as asserted by the Examiner, it was clearly not the Applicants intent to make this argument, nor did the Applicants make this argument. Rather, Applicants were simply arguing that claims 1, 2-20 and 56 all belong to a single invention. (See page 3 of Response dated December 6, 2005, pages 2 and 3 of the Petition From Requirement for Restriction dated December 3, 2004 and pages 4-6 of the Response dated May 20, 2004). Applicants also mentioned that the Examiner had not established that any of the features recited in claim 1 are patentably distinct over any of the features recited in claims 2-20

and 56. (See page 13 of the Amendment dated June 10, 2005 and pages 4-5 of the Response dated May 20, 2004). However, Applicants never actually made any statements regarding the merits of whether or not the features recited in claim 1 were patentably distinct from the features recited in claims 2-20 and 56 in terms of obviousness. In other words, Applicants were only discussing claims 1, 2-20 and 56 as belonging to a single invention but not in terms of the patentability (e.g. obviousness) of the species of these claims with regard to each other. Thus, the use of the expression "not patentably distinct" in seeking to overcome the restriction/election requirement was nothing more than an inadvertent mistaken use of this expression because it was clearly not being used to discuss the merits of whether or not the species of claims 1, 2-20 and 56 were obvious over each other.

To limit the Applicants claims based upon this inadvertent mistaken use of the expression "not patentably distinct" would be unduly burdensome to the Applicants because it may produce an unfair result in that it may prevent the patentability claims 1, 2-20 and 56 which would otherwise be patentable over the cited art. Therefore, Applicants kindly ask that the above alleged admission be withdrawn from application to claims 1, 2 4-20 and 56.

III. Claims 1, 2, 4-20 and 56 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kawasumi in view of Adachi.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference teaching. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Finally, the prior art reference must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the art and not based on applicant's disclosure. If an independent claim is non-obvious under section 103, then any claim depending therefrom is non-obvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The references of Kawasumi and Adachi cited by the Examiner, taken individually or in combination are legally insufficient for establishing a prima facie case of obviousness against claim 1. Therefore, the rejections under 35 U.S.C. § 103(a) of independent claim 1 and dependent claims 2, 4-20 and 56 should be reversed.

(i) Kawasumi in view of Adachi at the very least fails to teach or suggest an in-line system for manufacturing liquid crystal displays which includes “a substrate attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state” as essentially recited in claim 1.

Claim 1, recites, *inter alia*, “ an in-line system for manufacturing liquid crystal displays comprising: a sealant-applying unit...a sealant heat-treating unit... a liquid crystal depositing unit...*a substrate attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state* and an in-line convey unit conveying the substrates in the in-line system. (emphasis added).

The Kawasumi reference describes preparing a liquid crystal display device by applying an adhesive to at least one of the substrates 1, 2 in the bonding region provided along an outer periphery of the substrates 1, 2, supplying a liquid crystal material 3 to one end portion in the liquid crystal area of at least one of the substrates 1, 2 and then fixing the substrates 1, 2 together such that opposed surfaces of the substrates face each other. (See Col. 2, lines 19-31 of Kawasumi). Next, Kawasumi describes expanding the liquid crystal material 3 from one end portion to cover the entire liquid crystal area by exerting pressure on at least one of the opposed substrates from the one end portion to the other end portion in the liquid crystal area via a pressing means (e.g. a pressure roller 5) while moving the pressing means relative to the substrate. (See Col. 2, lines 31-37 of Kawasumi).

However, Kawasumi at the very least does not teach or suggest a substrate attaching unit which conjoins the substrates 1, 2 in a vacuum state as required by claim 1. In contrast, the Kawasumi reference expressly teaches away from the use of vacuum conditions and equipment for the manufacture of liquid crystal displays (LCDs). It is well known that under the U.S. patent

laws, when a prior art reference or references teaches away or leads away from a claimed invention, obviousness may be rebutted. (See MPEP 2145).

The Examiner states that Kawasumi does indeed teach a substrate attaching unit which conjoins the substrates under vacuum conditions. (See page 4 of the Final Office Action dated September 29, 2006). It is submitted that the Examiner's interpretation of Kawasumi as teaching a substrate attaching unit which conjoins the substrates under vacuum conditions is wholly erroneous for at least the reasons set forth below.

Although Kawasumi may mention vacuum conditions for manufacturing liquid crystal display (LCDs) in conjunction with describing other conventional processes, Kawasumi does so only for the purpose of teaching away from their use in manufacturing LCDs. Instead, it is clear that a primary objective of Kawasumi is to have LCD manufacturing processes which avoid the use of vacuum conditions altogether. The above statement is evidenced by the fact that Kawasumi only discusses what it perceives to be disadvantages associated with using vacuum conditions in manufacturing LCDs and also by the fact that none of the embodiments described in Kawasumi utilize vacuum conditions. For example, in Kawasumi it is stated throughout that using vacuum conditions results in "...long manufacturing time and high cost." (See Col. 1, lines 26-50 and Col. 7, lines 4-7 of the Kawasumi patent). Moreover, Kawasumi states that with its LCD manufacturing processes, the need for using vacuum apparatuses or vacuum conditions is no longer necessary and thus manufacturing costs may be kept low. (See Col. 7, lines 4-7 and Col. 21, lines 30-32 of the Kawasumi patent).

Furthermore, Applicants disagree with the Examiner's statement that Kawasumi mentions that the use of vacuum conditions provides suitable LCDs though more costly manufacturing conditions and affords better degasification of liquid crystal material. Rather, there does not appear to be any mention in Kawasumi whatsoever of any beneficial results stemming from the use of vacuum condition in manufacturing LCDs. On the contrary, Kawasumi, as mentioned above, only discusses disadvantages associated with using vacuum conditions in manufacturing LCDs and also states that its processes provide a cost effective replacement for those LCD manufacturing processes which utilize vacuum conditions. (See again Col. 1, lines 26-50, Col. 7, lines 4-7 and Col. 21, lines 30-32 of the Kawasumi patent).

Thus, as can be gleaned from the above, the teachings of Kawasumi clearly discourage and teach away from using vacuum conditions in manufacturing LCDs. Furthermore, the Adachi publication fails to cure the above deficiency of the Kawasumi patent. The Adachi reference purports to disclose forming a stable orientation film on a liquid crystal panel glass plate 2 by mounting the glass plate 2, with a conductive film and a fluoresin powder 4 as an orienting agent scattered on the glass plate 2, on a belt conveyor 1. (See Abstract of Adachi) However, Adachi is completely silent regarding a substrate-attaching unit receiving two substrates from a sealant-applying unit or a liquid crystal depositing unit and conjoining the substrates in a vacuum state as essentially recited in claim 1.

Therefore, for at least the reasons discussed, one skilled in the art, when combining the teachings of Kawasumi with Adachi, would clearly be led away from providing a LCD manufacturing process which included a substrate-attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state as required by claim 1. As a result, the Kawasumi and Adachi combination at the very least fails to teach or suggest providing the above-mentioned substrate attaching unit feature, as recited in claim 1.

Therefore, since Kawasumi and Adachi alone or in combination fail to teach or suggest all of the features recited in claim 1, these cited references are insufficient for establishing a prima facie case of obviousness. Accordingly, the above rejection to claim 1 under 35 U.S.C. §103(a) should be reversed. As claims 2, 4-20 and 56 depend from claim 1, these claims are believed allowable for at least the reasons set forth above with regard to claim 1.

(ii) Kawasumi in view of Adachi at the very least fails to teach or suggest an in-line system for manufacturing liquid crystal displays which includes “an in-line convey unit conveying the substrates in the in-line system” as essentially recited in claim 1.

Claim 1, recites, *inter alia*, “ an in-line system for manufacturing liquid crystal displays comprising: a sealant-applying unit...a sealant heat-treating unit...a liquid crystal depositing unit...a substrate attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state and *an in-line convey unit conveying the substrate in the in-line system.* (emphasis added).

As conceded by the Examiner, Kawasumi fails to teach or suggest an in-line conveying unit as recited in claim 1. (See page 6 of the Final Office Action dated September 29, 2006). The Examiner has relied upon the Adachi reference for teaching an in-line conveying unit. (See page 7 of the Final Office Action dated September 29, 2006).

Nevertheless, the combination of Adachi with Kawasumi still fails to cure the above deficiency of the Kawasumi. As discussed above, the Adachi reference purports to disclose forming a stable orientation film on a liquid crystal panel glass plate 2 by mounting the glass plate 2, with a conductive film and a fluoresein powder 4 as an orienting agent scattered on the glass plate 2, on a belt conveyor 1. (See abstract of Adachi). However, contrary to the Examiner’s apparent characterization of the belt conveyor 1 feature described in Adachi as being the same or equivalent feature as the in-line conveying unit feature recited in claim 1, these features are really distinct structurally from one another and thus are not the same features.

For example, an exemplary embodiment of the present invention illustrates in-line convey units 1110, 1120, 1120, 1140, 1150, 1170 and 1180 which are within the scope of claim 1. (See Application at page 6, lines 6-20 and Fig. 3). Clearly, the belt conveyor 1 of Adachi does not have the same structure and thus is not the same feature as the in-line convey unit conveying the substrates in the in-line system, as recited in claim 1. Thus, the combination of Kawasumi with Adachi also at the very least fails to teach or suggest an in-line convey unit conveying the substrates in an in-line system, as essentially recited in claim 1.

Therefore, since Kawasumi and Adachi alone or in combination fail to teach or suggest all of the features recited in claim 1, these cited references are insufficient for establishing a prima facie case of obviousness. Accordingly, the above rejection to claim 1 under 35 U.S.C. §103(a) should be reversed. As claims 2, 4-20 and 56 depend from claim 1, these claims are believed allowable for at least the reasons set forth above with regard to claim 1.

(iii) Kawasumi in view of Adachi at the very least fails to teach or suggest an in-line system for manufacturing liquid crystal displays which includes “a sealant heat-treating unit forming a reaction-prevention layer on a surface of the sealant to prevent a reaction between the sealant and a liquid crystal material” as essentially recited in claim 1.

Claim 1, recites, *inter alia*, “ an in-line system for manufacturing liquid crystal displays comprising: a sealant-applying unit...*a sealant heat-treating unit forming a reaction-prevention layer on a surface of the sealant to prevent a reaction between the sealant and a liquid crystal material*... a liquid crystal depositing unit... a substrate attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state and an in-line convey unit conveying the substrates in the in-line system. (emphasis added).

The Examiner states that even without the Applicants alleged “admission” that the cited art still teaches all of the limitations recited in claim 1, including the sealant heat-treating unit feature. (See page 9, paragraph 3 of the Final Office Action dated September 29, 2006) However, the above statement by the Examiner is merely conclusory because the Examiner has at the very least failed to specifically mention where the sealant heat-treating unit feature as recited in claim 1 is taught or may be found in the cited art. Furthermore, the Kawasumi and Adachi references appear to be completely silent regarding an in-line system for manufacturing liquid crystal displays which includes a sealant heat-treating unit which forms a reaction-prevention layer on a surface of the sealant to prevent a reaction between the sealant and a liquid crystal material. Thus, Kawasumi and Adachi alone or in combination fail to teach or suggest the sealant heat-treating feature recited in claim 1 and the Examiner has failed to provide any evidence of this to the contrary.

Therefore, since Kawasumi and Adachi alone or in combination fail to teach or suggest all of the features recited in claim 1, these cited references are insufficient for establishing a prima facie case of obviousness. Accordingly, the above rejection to claim 1 under 35 U.S.C. §103(a) should be reversed. As claims 2, 4-20 and 56 depend from claim 1, these claims are believed allowable for at least the reasons set forth above with regard to claim 1.

IV. CONCLUSION

The Examiner has failed to establish a prima facie case of obviousness of the presently claimed invention under 35 U.S.C. 103(a) over Kamasumi in view of Adachi for at least the reasons discussed above. Accordingly, it is respectfully requested that the Board reverse all rejections of claims 1, 2, 4-20 and 56 under 35 U.S.C. 103(a).

Respectfully submitted,



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CLAIMS APPENDIX

1. (Previously presented) An in-line system for manufacturing liquid crystal displays, comprising:

a sealant-applying unit depositing sealant on one of two substrates, either one of the two substrates having at least one liquid crystal cell;

a sealant heat-treating unit forming a reaction-prevention layer on a surface of the sealant to prevent a reaction between the sealant and a liquid crystal material;

a liquid crystal depositing unit depositing the liquid crystal material on the substrate where the sealant is deposited;

a substrate-attaching unit receiving the two substrates from the sealant-applying unit or the liquid crystal depositing unit and conjoining the substrates in a vacuum state; and

an in-line convey unit conveying the substrates in the in-line system.

2. (Previously presented) The in-line system of claim 1, further comprising: a first loading unit loading one of the two substrates;

a second loading unit loading the other one of the two substrates; and

a substrate-combination unit providing the two substrates to the substrate-attaching unit.

3. (Cancelled)

4. (Previously presented) The in-line system of claim 2, wherein the first loading unit, the spacer-dispersing unit, the sealant-applying unit, the liquid crystal depositing unit, the substrate-combination unit, and the substrate-attaching unit are arranged in series.

5. (Previously presented) The in-line system of claim 4, wherein the second loading unit is connected to the substrate-combination.

6. (Previously presented) The in-line system of claim 2, wherein the first loading unit, the sealant-applying unit, the liquid crystal depositing unit, the substrate-combination unit, and the substrate attaching unit are arranged in series.

7. (Previously presented) The in-line system of claim 6, wherein the second loading unit, the spacer-dispersing unit and the substrate-combination unit are arranged in series.

8. (Previously presented) The in-line system of claim 1, wherein the substrate-attaching unit includes two or more vacuum chambers.

9. (Previously presented) The in-line system of claim 8, wherein the vacuum chambers are arranged in series.

10. (Previously presented) The in-line system of claim 8, wherein the vacuum chambers are arranged in parallel.

11. (Previously presented) The in-line system of claim 1, wherein the substrate-attaching unit comprises:

a first compression plate and a second compression plate supporting the two substrates and applying a predetermined force toward each other; and

an exposure unit hardening the sealant.

12. (Previously presented) The in-line system of claim 1, wherein the substrate-attaching unit comprises:

a first compression plate and a second compression plate for supporting the two substrates and applying a predetermined force toward each other, the first compression plate and the second compression plate having at least one vacuum hole for exhausting air from between the compression plates;

a support tube provided between the first compression plate and the second compression plate for sealing a space therebetween, the support tube having an inner space for exhausting air to adjust an interval between the first compression plate and the second compensation plate; and

an exposure unit hardening the sealant.

13. (Previously presented) The in-line system of claim 12, wherein the substrate-attaching unit has a plurality of the vacuum holes at predetermined locations for exhausting in a predetermined sequence.

14. (Previously presented) The in-line system of claim 13, wherein the vacuum holes are formed at corners or a center portion of each side of the first compression plate and the second compression plate.

15. (Previously presented) The in-line system of claim 13, wherein the vacuum holes are slits having a predetermined length.

16. (Previously presented) The in-line system of claim 1, wherein the liquid crystal depositing unit comprises a syringe-type liquid crystal depositer for depositing the liquid crystal material at specific predetermined locations in the liquid crystal cell.

17. (Previously presented) The in-line system of claim 1, wherein the liquid crystal depositing unit comprises is a spray type liquid crystal depositer for depositing the liquid crystal material over an entire surface of the liquid crystal cell.

18. (Previously presented) The in-line system of claim 1, wherein the sealant-applying unit deposits the sealant in a closed loop without a liquid crystal injection hole.

19. (Previously presented) The in-line system of claim 1, wherein the sealant is hardened by infrared rays.

20. (Previously presented) The in-line system of claim 1, wherein the sealant includes one or more buffer regions to allow flow of excess liquid crystal material.

21-55. (Cancelled)

56. (Previously presented) The in-line system of claim 1, further comprising a spacer-dispersing unit dispersing spacers on either one of two substrates.